# Rick Archibald

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**Education**

**Arizona State University**                                    *Ph.D. in Mathematics*
Tempe, AZ.                                                    **August 1998– May 2002**
Thesis Advisor: Anne Gelb. Thesis title: *Boundary Detection and Reconstruction in Magnetic Resonance Imaging*. Focus of study: spectral methods, partial differential equations, statistics, computational biology, and medical image analysis.

**University Of Alberta**                                    *M.Sc. in Applied Mathematics*
Edmonton, AB.                                                **September 1996– April 1998**
Thesis Advisor: Abel Cadenillas. Focus of study: mathematical finance, stochastic partial differential equations, and numerical computation.

**University Of Alberta**                                    *B.Sc. in Honors Physics*
Edmonton, AB.                                                **September 1992– April 1996**
Focus of study: partial differential equations, computer programming, and biological physics.

**Professional Experience**

**Computer Science and Mathematics Division**                *Staff Scientist*
Oak Ridge National Laboratory                                **August 2007–Present**
Supervisor: Clayton Webster. Focus of study: Climate science, experimental facilities data analysis, high performance computing, and uncertainty quantification.

**Computer Science and Mathematics Division**                *Householder Fellow*
Oak Ridge National Laboratory                                **August 2005–August 2007**
Supervisor: Ed D'Azevedo. Focus of study: hyperspectral imaging, nano-technology, parallel computing, and partial differential equations.

**Department of Neuroscience**                                *Post Doctorate*
Brown University                                             **August 2004–July 2005**
Supervisor: Jerome Sanes. Focus of study: Data fusion and beamforming in Electroencephalography (EEG), Magnetoencephalography (MEG) and functional Magnetic Resonance Imaging (fMRI).

**Center for System Science and Engineering Research**       *Post Doctorate*
Arizona State University                                     **May 2002–August 2004**
Supervisor: Frank Hoppensteadt. Focus of study: Dynamical nano-systems and image analysis.

**Alzheimer Disease Research Center**                        *Research Assistant*
Good Samaritan Hospital, AZ.                                 **January 1999– May 2002**
Studied under the guidance of Kewei Chen in the areas of medical imaging methods and analysis.

**Publications**

Please (see Google Scholar) for publications. Ten significant publications.

Doucet, Archibald, & Heller, "Machine Learning for Neutron Reflectometry Data Analysis of Two-Layer Thin Films", *Machine Learning: Science and Technology*, 2021.

Doucet, Samarakoon, Do, Heller, Archibald, Tennant, Proffen, & Granroth, "Machine Learning For Neutron Scattering at ORNL", *Machine Learning: Science and Technology*, **2**(2), 2020.

Madireddy, Park, Lee, Balaprakash, Yoo, Liao, Hauck, Laiu, & Archibald, "In Situ Compression Artifact Removal In Scientific Data Using Deep Transfer Learning and Experience Replay", *Machine Learning: Science and Technology*, **2**(2), 2020.

Archibald, Bao, & Yong, "Stochastic Gradient Descent Approach For Stochastic Optimal Control", *East Asian J. Appl. Math*, **10**(4), 2020.

Madireddy, Park, Lee, Balaprakash, Yoo, Liao, Hauck, Laiu, & Archibald, "Stochastic Gradient Descent Approach For Stochastic Optimal Control", *Machine Learning: Science and Technology*, **2**(2), 2020.

Archibald, Bao, Yong, & Zhou, "An Efficient Numerical Algorithm For Solving Data Driven Feedback Control Problems", *Journal of Scientific Computing*, **85**(2), 2020.

Archibald, Chow, DAzevedo, Dongarra, Eisenbach, Febbo, Lopez, Nichols, Tomov, Wong, & Yin, "Driving Scientific and Engineering Discoveries Through the Convergence of HPC, Big Data and AI", *SMC 2020. Communications in Computer and Information Science*, **1315**, 2020.

Feng, Archibald, and Maksymovych, "Lvy Backward SDE Filter for Jump Diffusion Processes and Its Applications in Material Sciences", *Communications in Computational Physics*, **27**(2), 589–618, 2019.

Brendan, Archibald, Azadmanesh, Vandavasi, Langan, Coates, Lynch, and Langan, "BraggNet: integrating Bragg peaks using neural networks", *Journal of Applied Crystallography*, **52**(4), 854–863, 2019.

Xian, Archibald, Mayer, Liu and Li, "An effective online data monitoring and saving strategy for large-scale climate simulations", *Quality Technology & Quantitative Management*, **16**(3), 330–346, 2019.

| Funded Grants – Only PI and Co-PI | Frameworks, Algorithms and Scalable Technologies for Mathematics (FASTMath) | *ASCR/DOE* |
|---|---|---|
| | PI (Data Analytic Lead): Rick Archibald | **October 2017–September 2020** |
| | Develop data analytic and machine learning tools for high performance computing. Total award 18M. | |
| | **Accurate Quantified Mathematical Methods for Neutron Science** | *ASCR/DOE* |
| | PI: Rick Archibald | **October 2014–September 2017** |
| | Solved mathematical challenges for Neutron sciences. Total award 2.4M. | |
| | **Sparse Recovery for Scientific Data** | *ASCR/DOE* |
| | Co-PI: Rick Archibald | **October 2014–September 2017** |
| | Sparse recovery methods for HPC datasets. Total award 1.5M. | |
| | **A Mathematical Environment for Quantifying Uncertainty: Integrated and Optimized at the Extreme Scale** | *ASCR/DOE* |
| | Co-PI: Rick Archibald | **October 2013–September 2016** |
| | Develop uncertainty quantification methods and theory at scale . Total award 4.2M. | |
| | **Advanced Dynamically Adaptive Algorithms for Stochastic Simulations on Extreme Scales** | *ASCR/DOE* |
| | PI: Rick Archibald | **October 2010–September 2013** |

Advanced stochastic methods for computational simulation. Total award 1.3M.

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| **Service** | **Computational and Applied Mathematics Group** | *ORNL* |
| | Group Leader | **October 2019– Present** |

Advisor to the Computational and Applied Mathematics group leader. Have the ability to help run all aspects of the group.

**Computational and Applied Mathematics Group**                                            *ORNL*
Group Deputy Leader                                            **October 2016– October 2019**
Advisor to the Computational and Applied Mathematics group leader. Have the ability to help run all aspects of the group.

**Division Operational Committee**                                            *ORNL*
Member                                            **December 2012– February 2015**
Scientific member of Computer and Applied Mathematics Division operational committee. Responsible for setting operation policy for the division.

**Advisory Board for KIAPS**                                            *Soul, South Korea*
Member                                            **December 2011–November 2012**
Reviewed, provided guidance, and loaned expertise to the newly formed Korean Institute of Atmospheric Prediction Systems (KIAPS).

**Computer and Applied Mathematics Division Distinguish Seminar Series**                                            *ORNL*
Leader                                            **October 2008–September 2010**
Directed distinguished seminar series for division, responsible for all aspects, from targeting speakers to facilitating interactions with staff.

**Affiliations**    **Institute of Functional Imaging of Materials**                                            *ORNL*
Mathematics Lead                                            **September 2014– Present**
One of three leads for the Institute of Functional Imaging of Materials, focusing on mathematical methods and theory for experimental data at ORNL. Coordinate a team of thirty members on the mathematical research directions of the institute.

**Ugly Data Days**                                            *ORNL*
Lead                                            **September 2017**
Promote collaboration between experimental scientist and experts in data analytics at ORNL (UDD).

**International Journal of Computer Mathematics**                                            *Journal*
Associate Editor                                            **September 2012– 2018**
Editors for the International Journal of Computer Mathematics, focusing on computational mathematics and applications.

**Climate Change Science Institute**                                            *ORNL*
Member                                            **September 2009– 2016**
Founding member of the Climate Change Science Institute, which consists of hundreds of scientist across ORNL. Part of interdisciplinary team that is delivering a new climate model to the Department of Energy, with a focus of national energy needs and predictions, and running at the highest possible resolution on world class computing facilities. Actively part of mathematical and computational work for this climate model.

**Collaborators (past 48 months) and coeditors (past 24 months)**

A. Agrawal (Northwestern University); P. Balaprakash (Argonne National Laboratory); Y. Cao (Auburn University); A. Choudhary (Northwestern University); E. Chow (Georgia Institute of Technology); E. DAzevedo (Oak Ridge National Laboratory); J. Dongarra (University of Knoxville); M. Doucet (Oak Ridge National Laboratory); O. Dyck (Oak Ridge National Laboratory); K. Evans (Oak Ridge National Laboratory); D.J. Gardner (Lawrence Livermore National Laboratory); C. Hauck (Oak Ridge National Laboratory); W.T. Heller (Oak Ridge National Laboratory); S. Kalinin (Oak Ridge National Laboratory); Q. Kang (Northwestern University); P. Laiu (Oak Ridge National Laboratory); W.K. Liao (Northwestern University); K. Law (Florida State University); S. Lee (Northwestern University); S. Madireddy (Argonne National Laboratory); V. Sobes (University of Knoxville); B. Sumpter (Oak Ridge National Laboratory); X. Tu (University of Kansas); M. Taylor (Sandia Laboratories); C. Woodward (Lawrence Livermore National Laboratory);

**Graduate Advisor**

Anne Gelb (Arizona State University)

**Graduate and postdoctoral advisees (past 60 months)**

F. Bao (Florida State University); R. Bernard (Western Washington University); R. Tuo (Texas A&M University);